

FEM DaimlerChrysler S-Class Coupe in GMTex

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Agenda

- Quadrant Company Information
- GMT/GMTex Materials
- FEM in GMTex





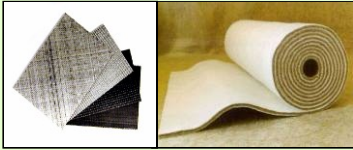

Quadrant Company Information

Quadrant Company Information

Business	Polymer Materials Processing (Thermoplastic Semi-finished and Finished Products)
Net Sales	CHF 750 Mio (2006)
Customers	75% Broadly Diversified, 25% Automotive
Business Divisions	High-Performance Plastics (QEPP/QCMS) Plastic Composites (QPC) / Cable Protection Systems (QCPS)
Market Position	Leading in all Areas of Activity
Regional Headquarters	Lenzburg (CH), Tielt (B), Reading (PA / USA), Hongkong
Employees	2'400
Ownership	Directors / Management (19%) > 1'000 Institutional and Private Shareholders (81%)

Quadrant Company Information



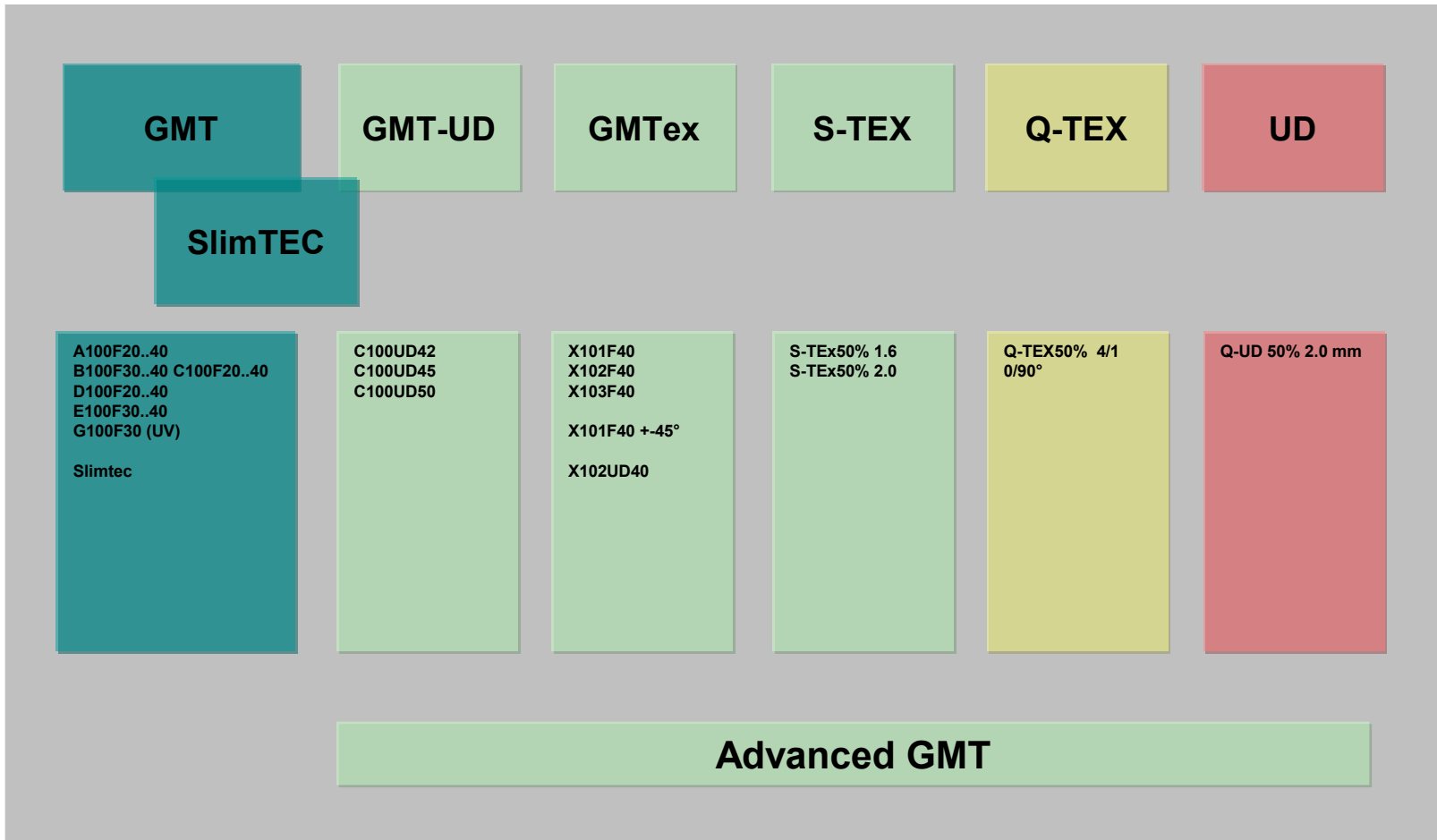
	QEPP	QCMS	QPC	QCPS
Business				
Operating since	1933	1933	1978	1952
Products	Engineering Plastic Shapes - AEP - GEP - U-PE (Poly Hi Solidur) semi-finished products & parts	Technical Components & Technical Systems from Engineering Plastics finished products	Glass Mat Thermoplastics (GMT) & Low Weight Reinforced Thermoplastics (SymaLITE) semi-finished products	Cable Protection Systems (Symalit Brand) finished products
Key Markets	widely diversified	Machinery & Equipment Manufacturing, Electrical & Electronics, Medical, Automotive	Automotive	Utilities, Telecom, Construction
Market Position	World Leader in Engineering Plastic Shapes for Machining	Top Ten Europe in Technical Injection Moulding	World Leader in Glass Mat Thermoplastics (GMT)	Swiss Leader in Cable Protection Systems
Division	HIGH-PERFORMANCE PLASTICS		PLASTIC COMPOSITES / CABLE PROTECTION SYSTEMS	
Employees	≈2'100		≈300	
Net Sales	80%		20%	



GMT/GMTex Materials

GMT/GMTex Materials

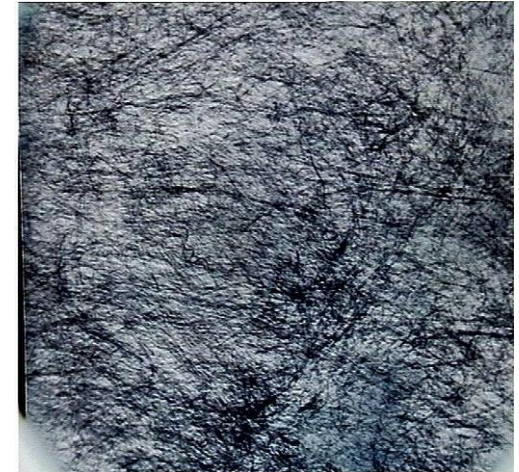
Material grades for structural applications



GMT/GMTex Materials

Material properties

- Fiber lengths > 25 mm
- Fiber network in 3D
- Long fiber content in the final parts
- Extensively isotropic
- Low CLTE
- High strength compared to short fiber materials
- Especially high impact resistance
- Temperature range in between -30° to 130° C
- Good fatigue properties vs. Al / metal



X-Ray measurement



GMTex grades with 1/1 reinforcement weave

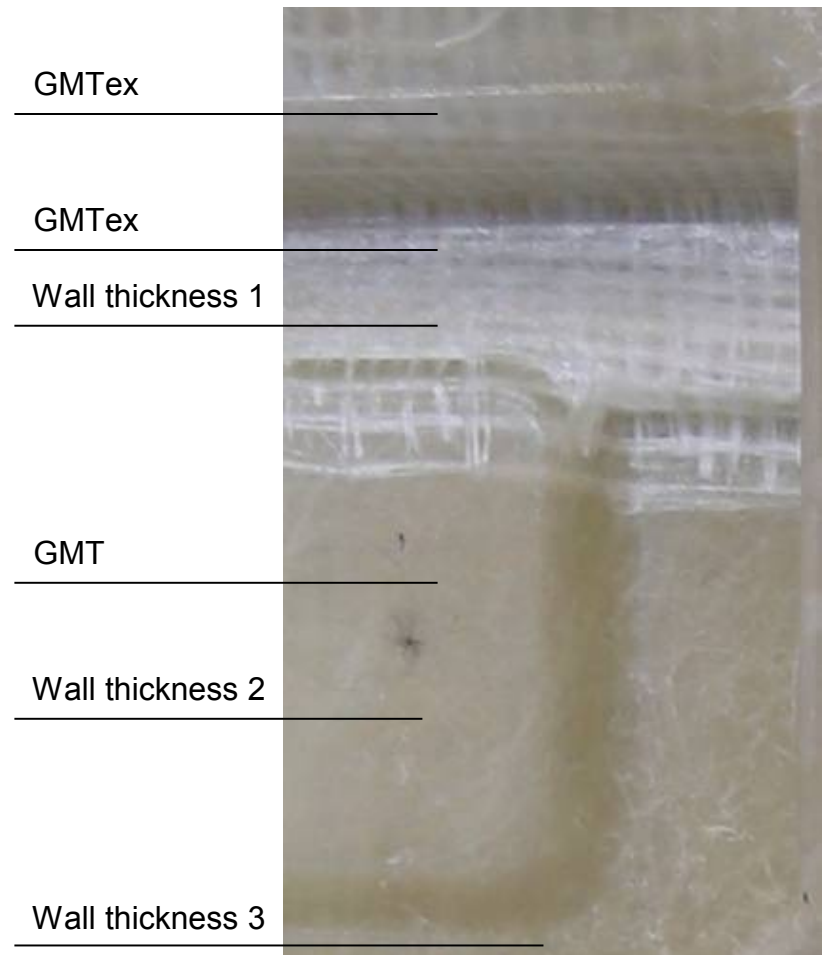


UD reinforcement

GMT/GMTex Materials

GMT/GMTex processing

- Different GMT/GMTex grades in one part applicable
 - Different wall thicknesses in one part feasible
 - Short cycle times
- Use of the fittest material in the part area where you really need it

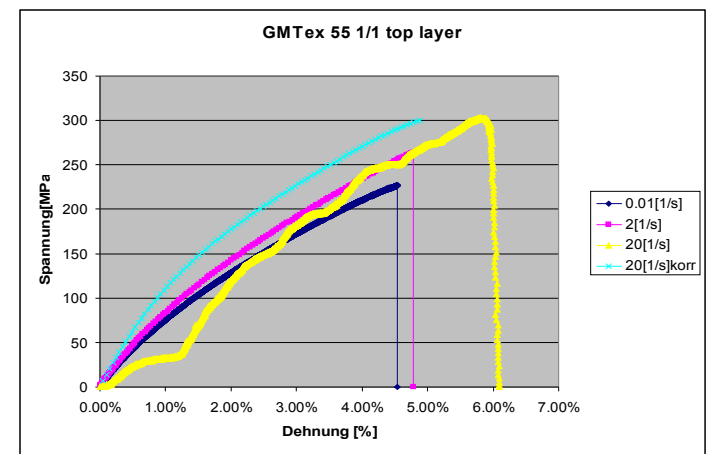
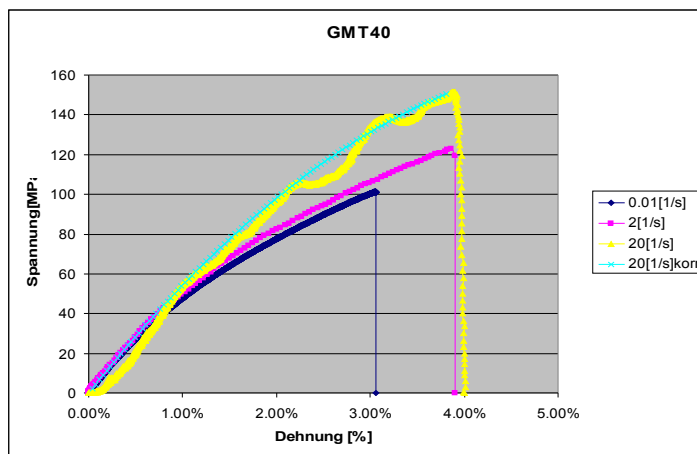
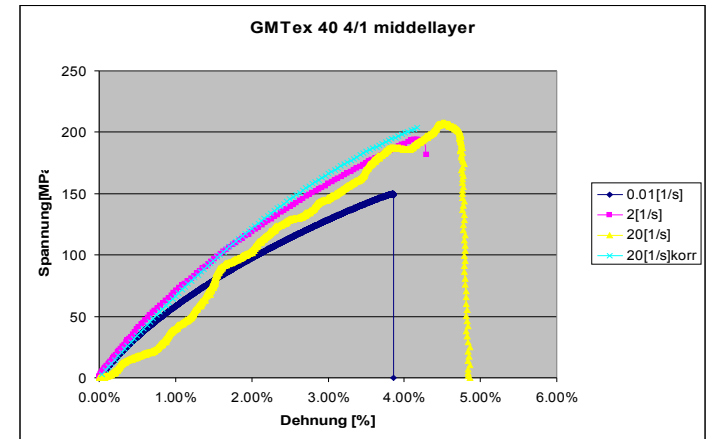


GMT/GMTex processing

GMT/GMTex Materials

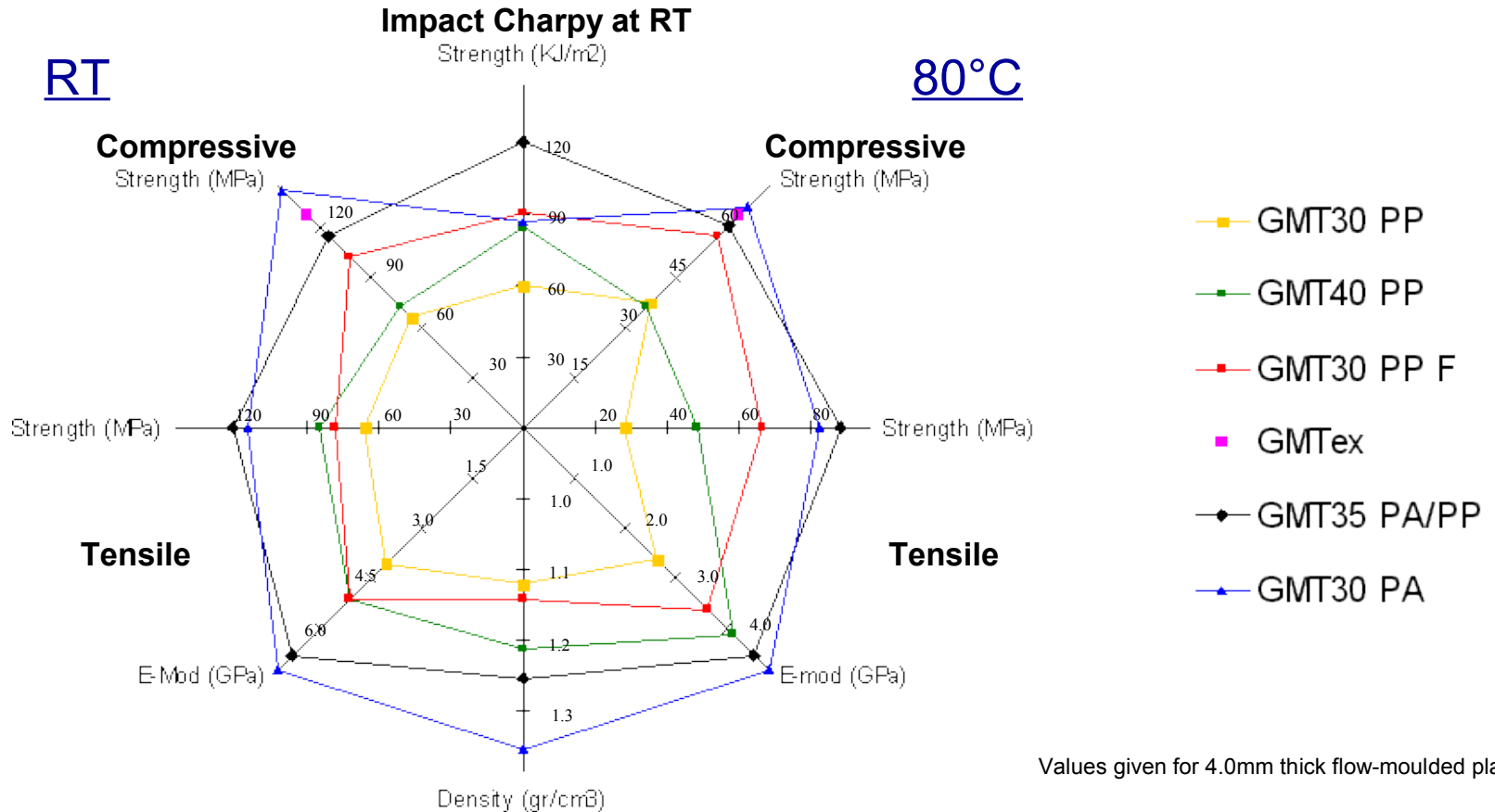
Static and dynamic material behavior

- Wide spectrum of material properties depending on material configuration
- High energy absorption especially in high dynamic areas



GMT/GMTex Materials

High heat GMT

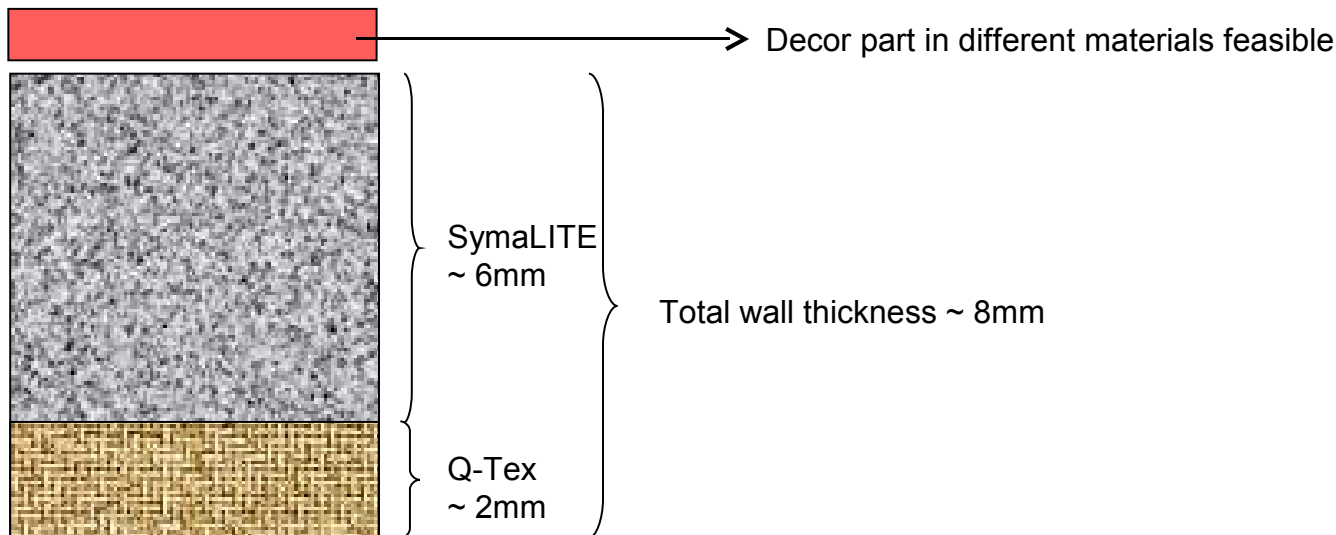


Values given for 4.0mm thick flow-moulded plates

GMT/GMTex Materials

Plastic hybrids / Plastic-Metal hybrids

- Material core PP-fiber/glass fiber blend
- Top layers SymaLITE core with Q-Text layer at the bottom
- Area weight 2400 g/m² in total
- Density depending on wall thickness
- Wall thickness circa 8 mm

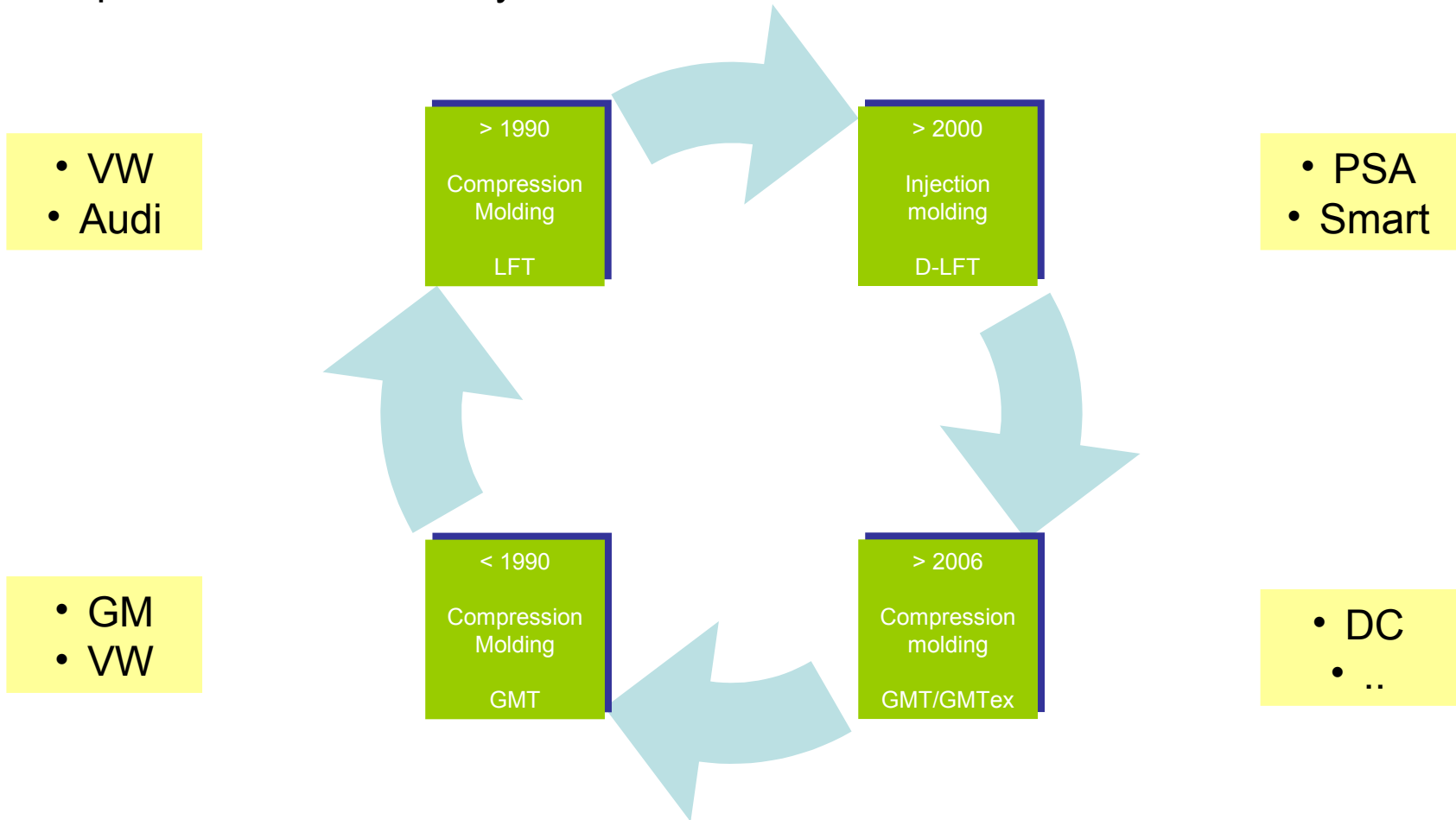




FEM in GMTex

FEM DC S-Class Coupe

Composite front end history



FEM DC S-Class Coupe

OEM requirements for GMTex FEM

- High safety standards
- High stiffness and dimensional stability
- Good fatigue behaviour up to 130°C
- Good impact behaviour
- No additional steel reinforcements
- Removable midsection to simplify the engine maintenance
- Good surface appearance, no corrosion protection
- Temperature resistance up to 130°C
- Weight saving
- Cost competitiveness
- Recyclables

FEM DC S-Class Coupe

Product information

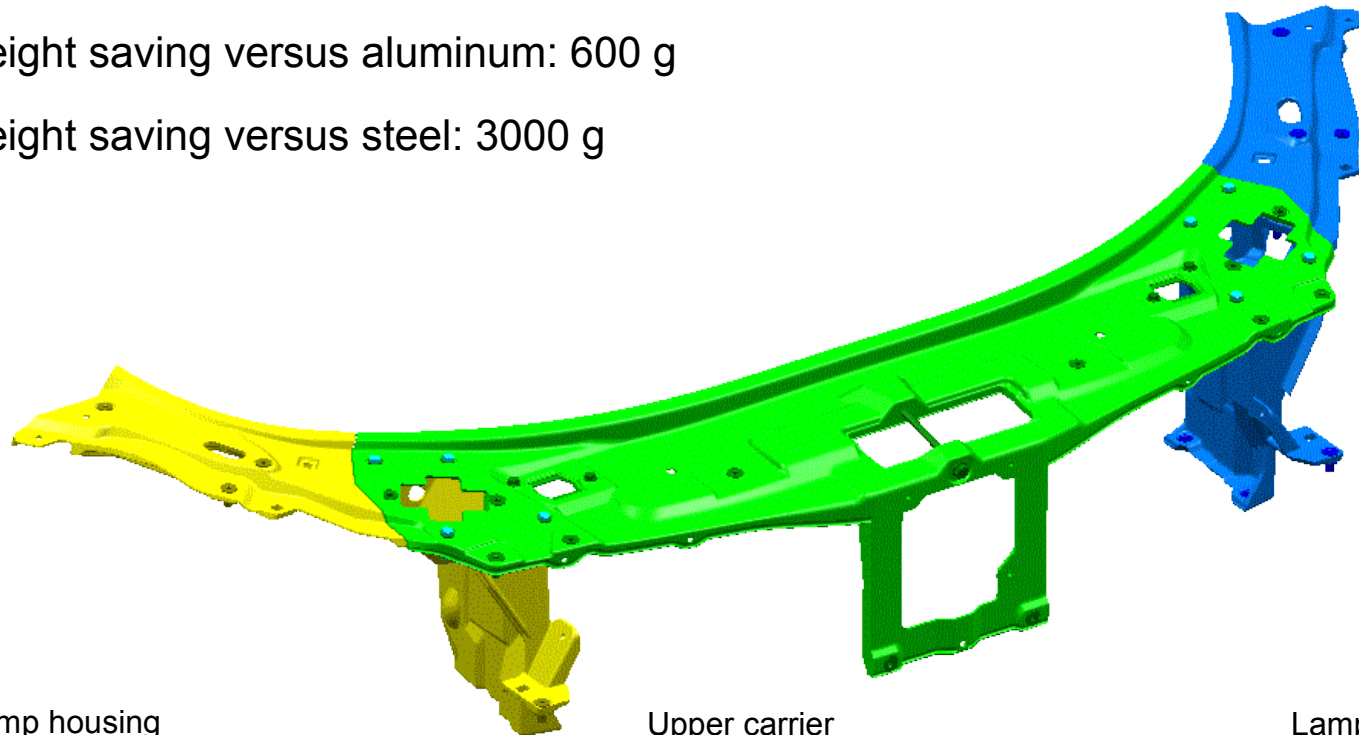
- Weight 3.4 kg
- Wall thickness 3.0 – 25 mm
- Functions
 - Fixation of hood lock (6000 N)
 - Fixation of radiator and lamp housing
 - Controlled energy absorption
 - Good dampening behaviour
 - Especially developed inserts for optimized assembly stability



FEM DC S-Class Coupe

Pre-assembled upper carrier with lamp housings

- substitution of 12 steel/aluminum parts with 3 GMT/GMTex parts
- weight saving versus aluminum: 600 g
- weight saving versus steel: 3000 g



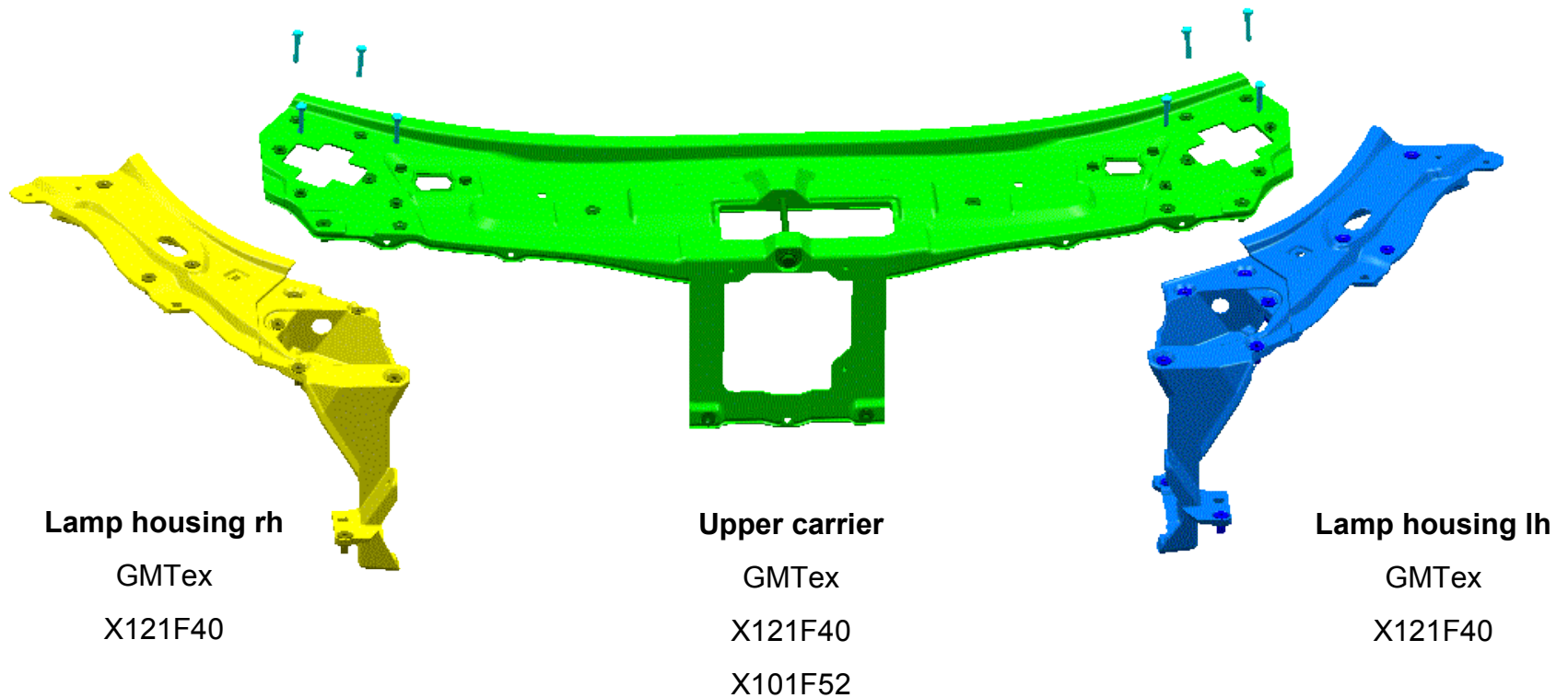
Lamp housing
rh
GMTex

Upper carrier
GMTex

Lamp housing lh
GMTex

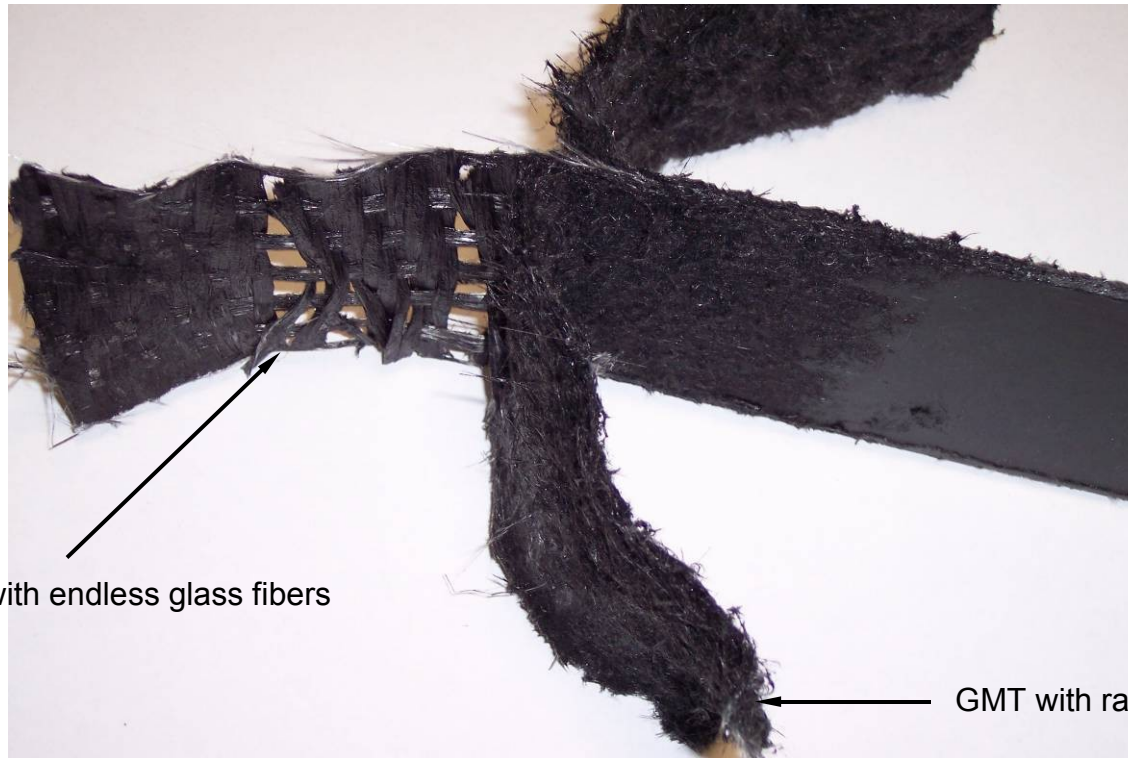
FEM DC S-Class Coupe

Single parts of composite components in GMT/GMTex



FEM DC S-Class Coupe

Material design GMTex



Weave inlay with endless glass fibers

GMT with random fibers on top

FEM DC S-Class Coupe

Visible areas at open hood with grained surface



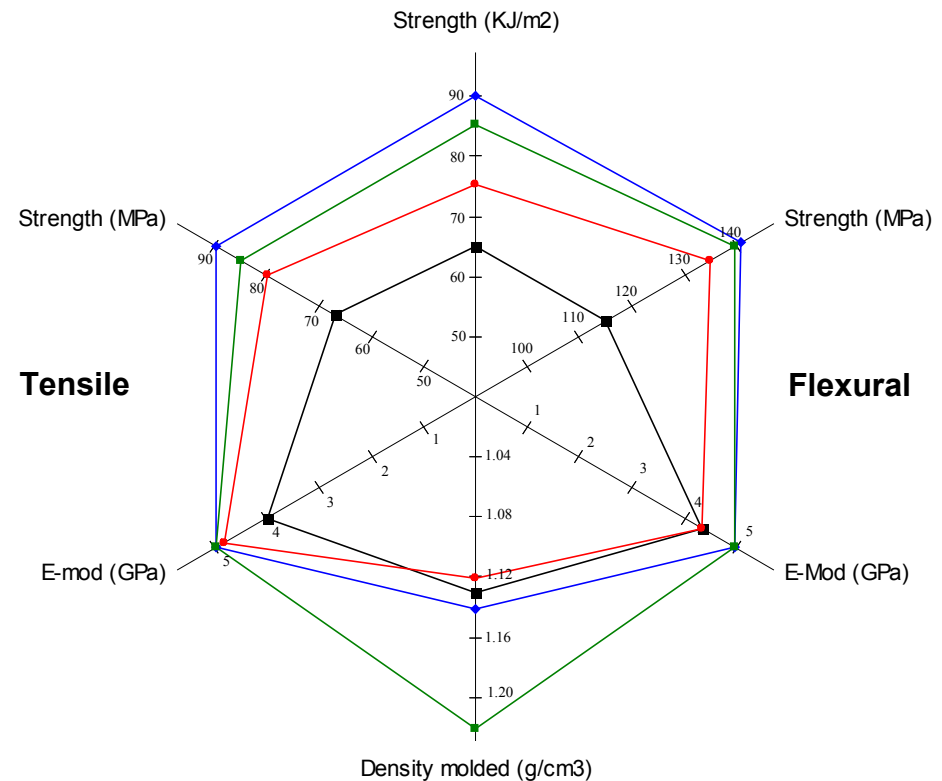
Surface with no grain

Surface grained

FEM DC S-Class Coupe

Outlook new GMT materials - High heat GMT/GMTex

- High temperature GMT
 - Mineral filled GMT
 - PP-PA blend
 - PA-GMT
- Weave reinforced GMT
 - Super GMTex
 - Thin weave reinforced GMT





Conclusions

Conclusions

- GMT/GMTex grades are dedicated for structural components with high dynamic loads
- Due to compression molding process different GMT/GMTex materials are applicable in the open mold
- The use of the right materials on the right position is easily achievable
- Different wall thicknesses in one part are possible
- Good crash performance is given which is substantial for structural applications
- High level of functional integration with flow molding compression molding is also possible even with weave reinforced grades
- High quality surface achievable even with weave reinforced materials
- Cost competitiveness is given by integration of functions
- New material developments are in the pipeline, e.g. LWRT structural applications and high heat GMT, to cover a broad range of structural applications